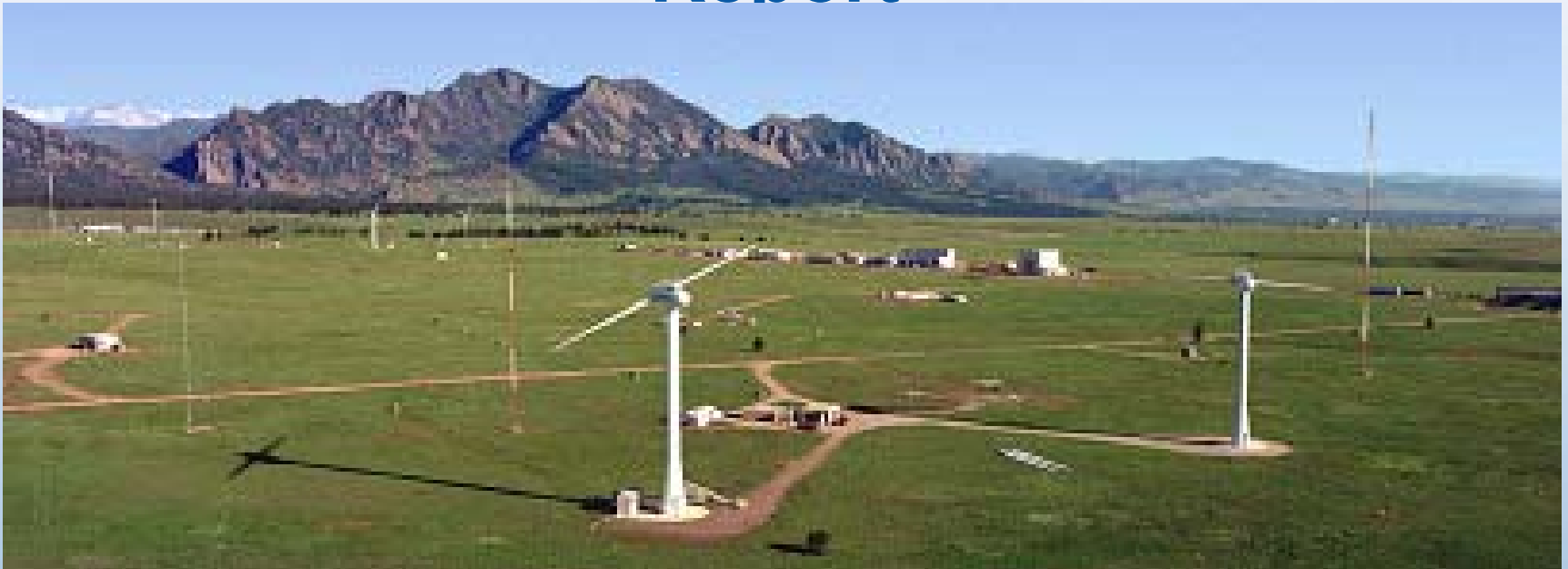


# Summary of the Clean and Diverse Energy (CDEAC) Wind Task Force Report



Michael Milligan  
Consultant

National Renewable Energy Laboratory

# Outline

- What is CDEAC and where did it come from?
- Wind Task Force objectives
- Wind supply in the WGA footprint
- Wind scenarios
- Task Force recommendations
- Summary



# What is CDEAC and Where did it Come From?

- Western Governors' resolution: 30 GW clean power in the west
- Task forces: wind, biomass, geothermal, solar, clean coal, energy efficiency, transmission
- Task force charge: Determine
  - How technology could contribute to goal
  - What are the barriers and how could they be resolved?

# WGA Footprint

Western Governor's  
Association Area

Combined Data  
50 m Wind Resource Data

The wind resource information shown for Kansas and most of Texas is from the 1987 "Wind Energy Resource Atlas of the United States". Wind resource is shown for every 1/3 degree of longitude by 1/4 degree of latitude. As little as 5% of the area shown in each area may be well-exposed to the power class displayed.

The remaining wind resource assessments were conducted on a state-by-state basis from 1999 to 2004. Over that time, the methodology and resolution of the data varied due to changes in the assessment process. Also, the fine resolution of these assessments may prevent many good resource areas from appearing when viewed at this scale.

Transmission line data from POWERmap, ©2005 Platts. Many lines smaller than 100 kV may not be included in this database.

## Wind Power Classification

| Wind Power Class | Resource Potential | Wind Power Density at 50 m W/m <sup>2</sup> | Wind Speed <sup>a</sup> at 50 m m/s | Wind Speed <sup>a</sup> at 50 m mph |
|------------------|--------------------|---|-------------------------------------|-------------------------------------|
| 1                | Poor               | 0 - 200                                     | 0.0 - 5.6                           | 0.0 - 12.5                          |
| 2                | Marginal           | 200 - 300                                   | 5.6 - 6.4                           | 12.5 - 14.3                         |
| 3                | Fair               | 300 - 400                                   | 6.4 - 7.0                           | 14.3 - 15.7                         |
| 4                | Good               | 400 - 500                                   | 7.0 - 7.5                           | 15.7 - 16.8                         |
| 5                | Excellent          | 500 - 600                                   | 7.5 - 8.0                           | 16.8 - 17.9                         |
| 6                | Outstanding        | 600 - 800                                   | 8.0 - 8.8                           | 17.9 - 19.7                         |

<sup>a</sup> Wind speeds are based on a Weibull k value of 2.0

## Transmission Lines Voltage

|  |           |
|--|-----------|
|  | 1000 (DC) |
|  | 500       |
|  | 345       |
|  | 230, 287  |
|  | 100 - 161 |
|  | 50 - 69   |

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# Wind Task Force Objectives

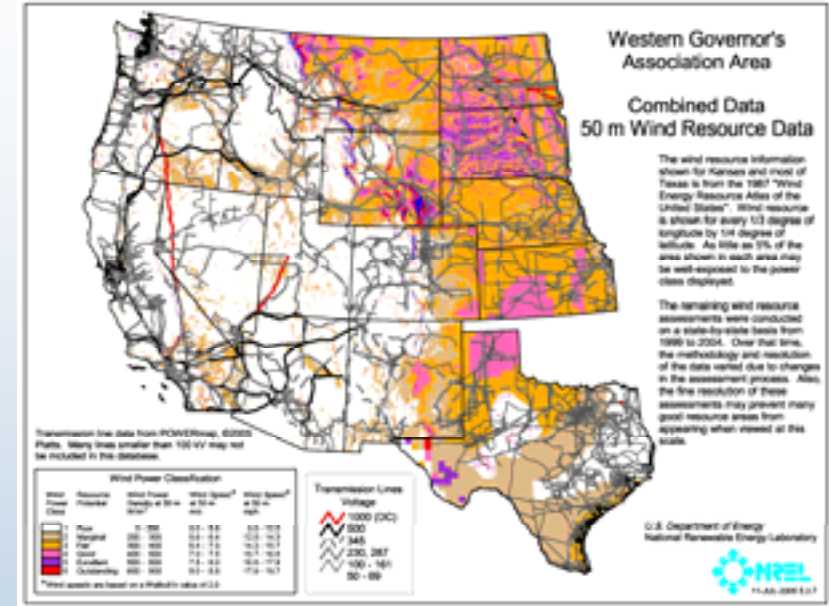


- Develop supply estimates for wind
- Construct wind scenarios for transmission modeling of the Western Interconnection
  - Capacities
  - Bus locations
  - Hourly generation profiles
- Recommendations to achieve 30 GW goal/wind contributions to the goal



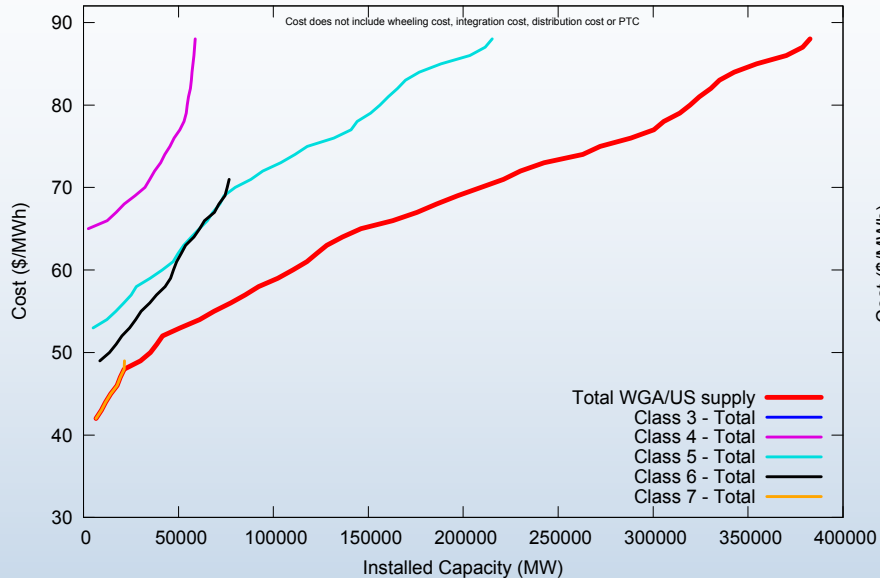
# Supply Curve Development

- Objective to quantify wind availability in WGA footprint
- Based on GIS data used for map development
- Binned by wind class → creates step in supply curve
- Static transmission line ratings and loads
- Wind speed @ 50 meters (modern turbines @ 80 m, 100 m in near future)
- Maps may miss good wind sites; some maps need updating
- Modern/existing wind turbine technology (does not consider technical progress/cost reductions)
- Current costs have spiked: trend or temporary blip?

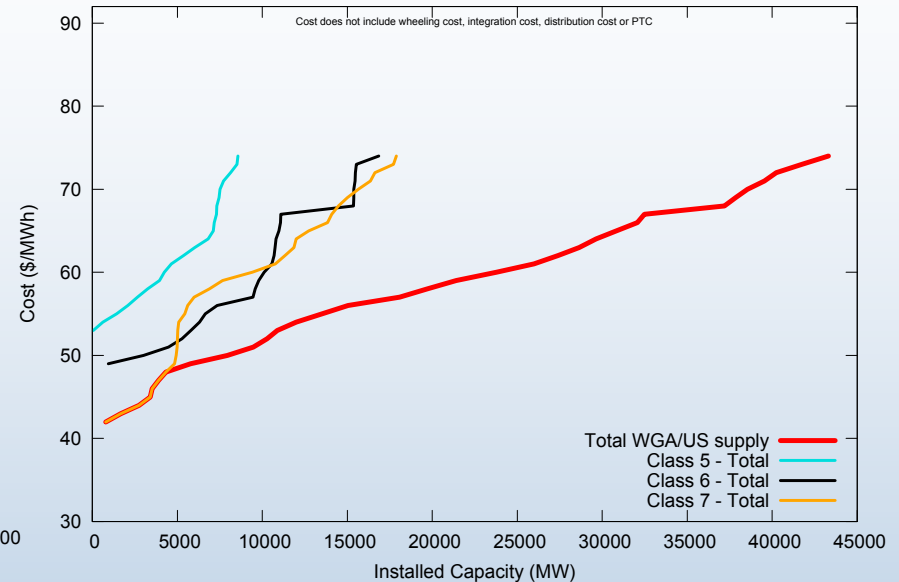


# WGA Supply Curves for Wind

Wind Energy Supply Curve - 20% of Existing Lines and 20% of Peak City Demand - Total



Wind Energy Supply Curve - 20% of Peak City Demand - Total



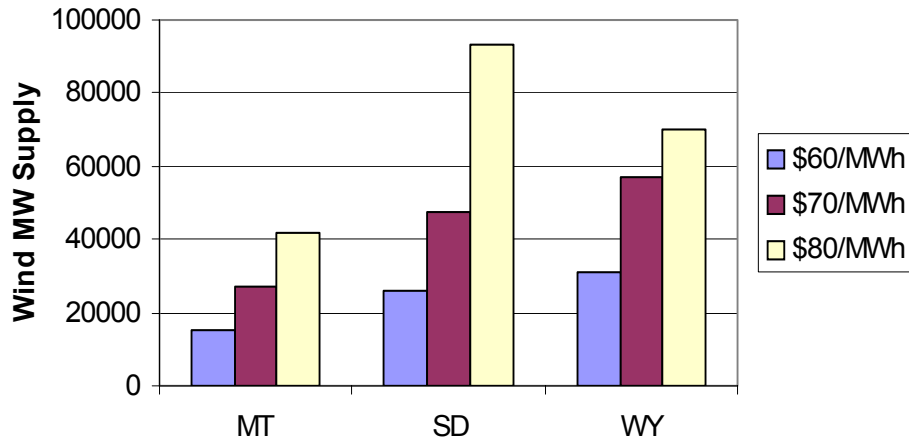
## WGA/CDEAC States

| Price    | 20% Transmission | No Transmission | Difference |
|----------|------------------|-----------------|------------|
| \$60/MWh | 115,000          | 25,000          | 90,000     |
| \$70/MWh | 215,000          | 39,000          | 176,000    |
| \$80/MWh | 320,000          | 40,000          | 280,000    |

# Available transmission increases the supply of wind: some high-wind states

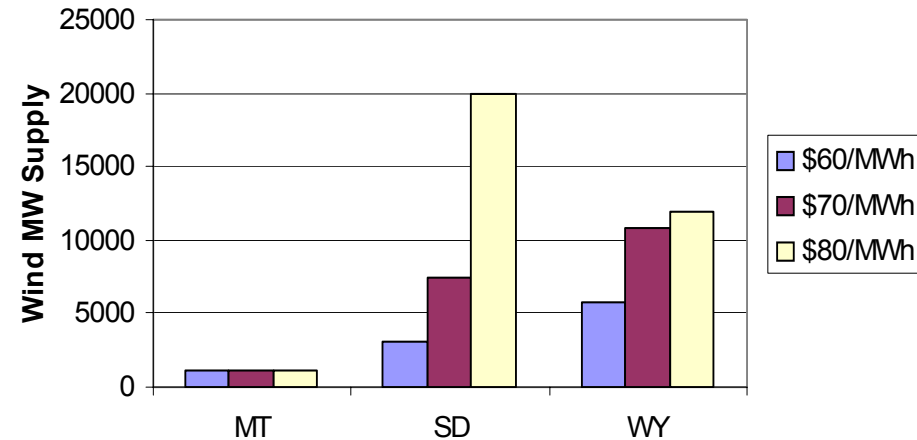
Note different scales

20% Transmission Case



Assuming 20% of existing transmission is available for wind

No Transmission Case



Assuming no existing transmission is available for wind, all new transmission is built by wind

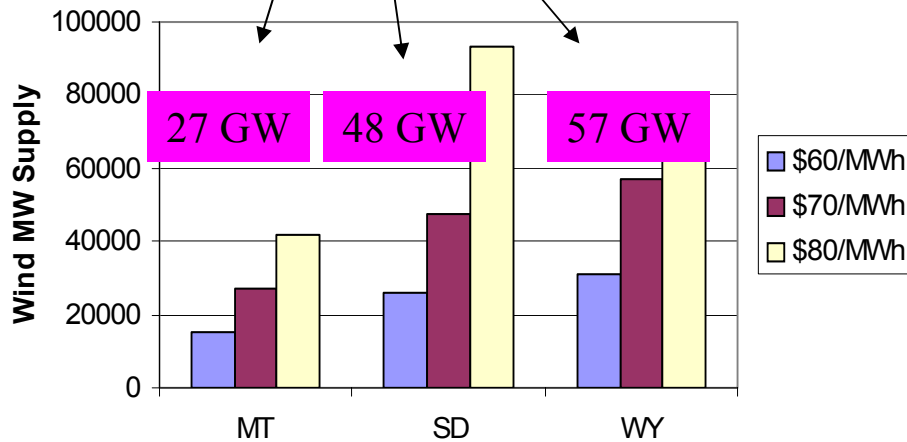


# Available transmission increases the supply of wind: some high-wind states

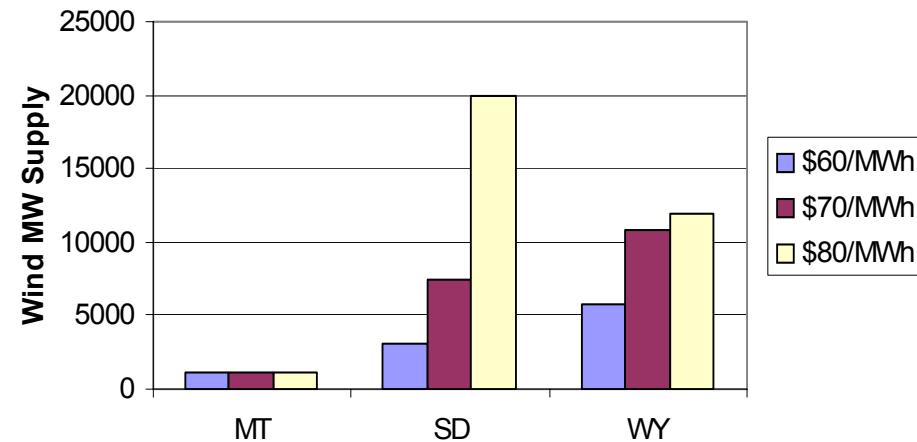
At \$70/MWh: 132 GW from 3 key states if 20% of wind can fit on transmission

Note different scales

20% Transmission Case



No Transmission Case



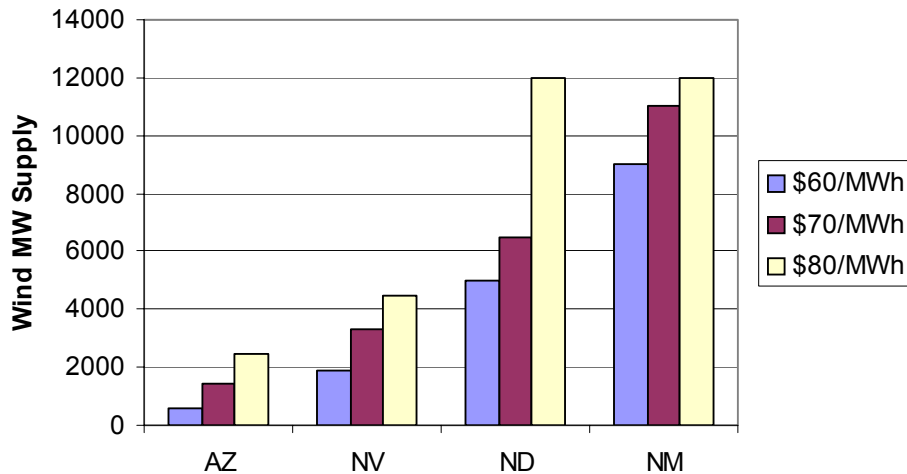
Assuming 20% of existing transmission is available for wind

Assuming no existing transmission is available for wind, all new transmission is built by wind

# Other States

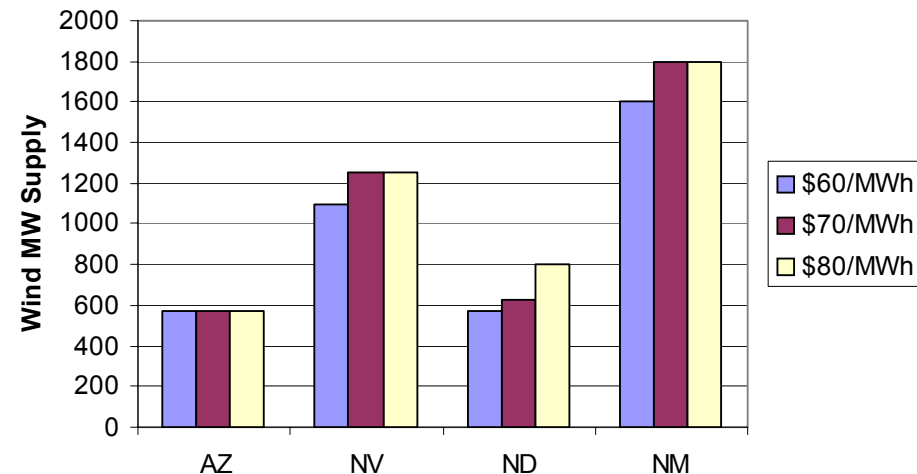
Note different scales

20% Transmission Case



Assuming 20% of existing transmission is available for wind

No Transmission Case



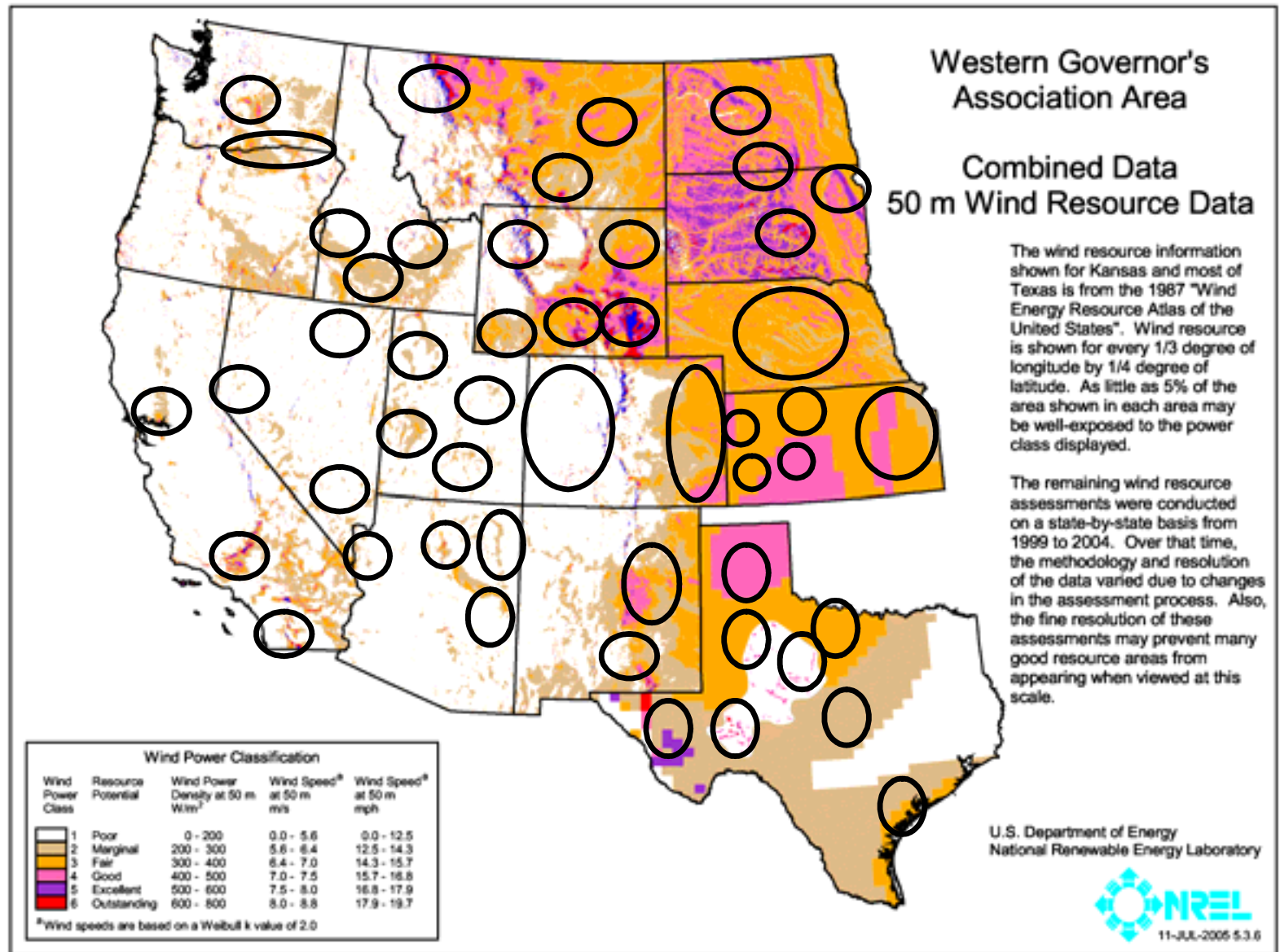
Assuming no existing transmission is available for wind, all new transmission is built by wind

# Scenario Development

- Supply curve does not indicate which wind locations/supplies developed first
  - IRP
  - RPS
- Compiled information from regional and subregional transmission studies, IRPs, and RPS requirements
- Three scenarios: low, medium, high



# Wind Task Force Aggressive Scenario Based on Existing IRP, RPS, Transmission Studies: Nearly 55 GW of Wind



## Western Governors' Association Wind Additions: Scenario 1



No new  
transmission,  
limited flex-firm,  
low-range of  
build out

Total: 9,175 MW

## Western Governors' Association Wind Additions: Scenario 2



New flex-firm  
transmission,  
mid-range of  
build out

Total: 25,266 MW



## Western Governors' Association Wind Additions: Scenario 3



Maximum build-out. NM and CA cases may not be consistent

Total: 54,724 MW

# Task Force Recommendations

- Support PTC extension
- Implement a conditional-firm, redispatch, and related tariff reform transmission products where feasible and consistent with ISO or RTO policy. Support the review and reasonable assessment of Available Transfer Capability (ATC) on existing transmission paths.
- Reform imbalance penalty policy based on cost-causation principles and link to near-term scheduling and wind forecasting.
- Urge state commissions, state legislatures, and FERC to encourage expanded transmission services and facilities for wind resource development areas to meet RPS, IRP and state goals (renewable trunk lines).

# Task Force Recommendations (2)

- Enhance regional transmission planning capabilities to better identify beneficiaries of transmission expansion, recognizing that some benefits of transmission expansion are widely distributed;
- Urge Public Utility Commission (PUC) findings that transmission projects to support meeting Renewable Portfolio Standards (RPS) requirements are a public benefit and should be granted rolled-in rates/cost recovery;
- Coordinate federal-state-local-tribal siting for transmission and wind projects, and develop transmission corridors on federal lands.

# Task Force Recommendations (3)

- Support studies of integration costs for higher levels of wind penetrations and allow utility cost recovery of such study costs.
- Support studies of opportunities for federal Power Marketing Administrations to integrate large amounts of wind into the power system.
- Support studies and R&D to develop storage and generating options that can complement the intermittency of wind generation.
- Government wind support
  - Require that state utility commissions implement incentives for regulated utilities that make new wind resource acquisitions a profitable course of action through performance based regulatory systems.
  - Direct the acquisition of state/educational institution wind
  - Encourage tribal/local government wind procurement (green tags)
  - Pursue smaller wind projects for self generation

# Next Steps

- WGA meets next week to consider the report
- National Wind Coordinating Council moving forward: Transmission Workshop in Denver, Jul 18-19

# Summary and Conclusions

- Significant wind resource near transmission—easily enough to meet the WGA goals
- Wind costs depend on transmission proximity and loading
- With current wind turbine cost uncertainties, unclear how long-term supply will respond
- Near-term development may not strictly follow supply curves: RPS, IRP are drivers
- CDEAC Wind Task Force Report on the web  
<http://www.westgov.org/wga/initiatives/cdeac/wind.htm>



